Energy transfer from the host to the dopant in $ZrO_2:Sm^{3+}$ samples prepared by sol-gel

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Pure and Samarium doped monoclinic zirconium oxide was prepared by the Sol-Gel method and the photoluminescence (PL) characterization was performed. The experimental spectra suggested the presence of non-radiative energy transfer processes from the host (ZrO2) to the dopant (Sm3+) as can be seen at Fig. 1. The spectrum of the signal emitted, obtained when the host was excited with a pumping signal centered at 320 nm, showed several peaks corresponding at different transitions of the samarium ions (see Fig. 2). The main emission peaks were centered at 569, 607, 613 and 618 nm. Probability and efficiency of energy transfer are reported for different concentration of active ions. The excellent chemical and photochemical stability of monoclinic zirconium oxide as well as its low phonon energy suggest a large potential of this material for a number of applications such as active optical windows, new generation television screen and as phosphorus material (1-2).

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(2) R. Reisfeld, M. Zelner, A. Patra; J. Alloys and Compound 300-301, 147(2000).

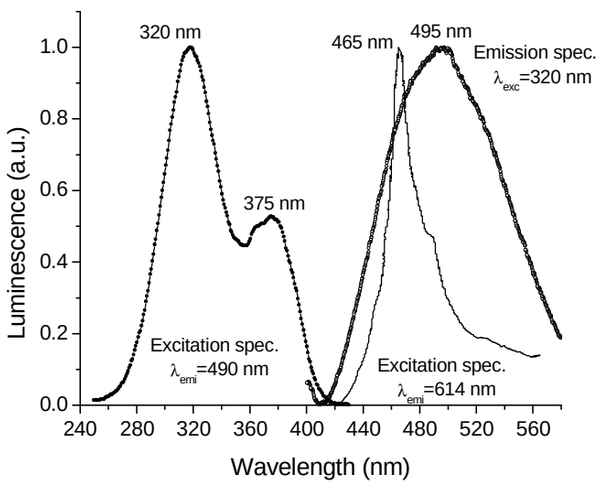

Fig. 1 Emission (495 nm)and excitation (320 nm) spectrum of pure zirconium oxide, and excitation spectrum (465 nm) of samarium doped sample when the emission was centered at 614 nm.

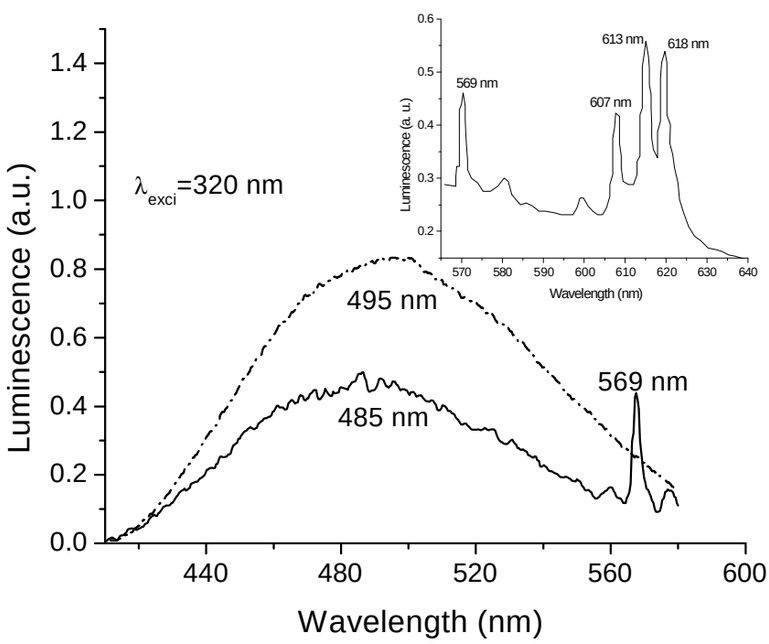

Fig. 2 Emission of undoped and samarium doped monoclinic zirconium oxide powder. The inset shows different emission peaks of the samarium ions, when the sample excited at 320 nm.